

# Bubble Sort

## Introduction

**Bubble sort** is a simple comparison sorting algorithm where the list is repeatedly traversed through, swapping in-place any items that are in the wrong order. The algorithm is named as such because large values "bubble" up rather fast early up in the algorithm.

## Performance

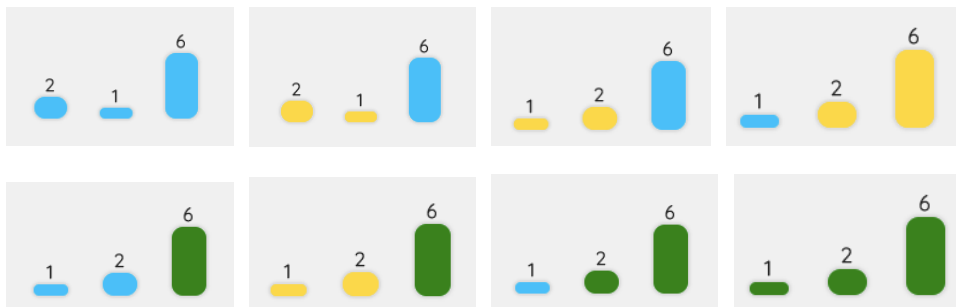
Worst-case time complexity	$O(n^2)$
Average time complexity	$O(n^2)$
Best-case time complexity	$O(n)$
Worst-case space complexity	$O(1)$

## Pseudocode

```
bubble_sort(list of t)
    temp as t
    swapped as boolean
    for i = list.count - 1 to 0 step -1
        swap = false
        for j = 0 to i - 1
            if list(j) > list(j + 1)
                temp = list(j) // swap
                list(j) = list(j + 1)
                list(j + 1) = temp
                swapped = true
        if not swap then
            return
```

## Example

Sorting the list: 2,1,6



## Implement with programming language

### Java

```
public static void bubbleSort(int arr[]) {  
  
    for(int i =0 ; i<arr.length-1 ; i++) {  
  
        for(int j=0 ; j<arr.length-1-i ; j++) {  
  
            if(arr[j]>arr[j+1]) {  
                int temp = arr[j];  
  
                arr[j]=arr[j+1];  
  
                arr[j+1]=temp;  
  
            }  
        }  
    }  
}
```

### JavaScript

```
function bubbleSort(arr) {  
    var i = arr.length, j;  
    var tempExchangVal;  
    while (i > 0) {  
        for (j = 0; j < i - 1; j++) {  
            if (arr[j] > arr[j + 1]) {  
                tempExchangVal = arr[j];  
                arr[j] = arr[j + 1];  
                arr[j + 1] = tempExchangVal;  
            }  
        }  
        i--;  
    }  
    return arr;  
}  
  
var arr = [3, 2, 4, 9, 1, 5, 7, 6, 8];  
var arrSorted = bubbleSort(arr);  
console.log(arrSorted);  
alert(arrSorted);
```

C

```
#include <stdio.h>

#define ARR_LEN 255
#define elemType int

void bubbleSort (elemType arr[], int len) {
    elemType temp;
    int i, j;
    for (i=0; i<len-1; i++)
        for (j=0; j<len-1-i; j++) {
            if (arr[j] > arr[j+1]) {
                temp = arr[j];
                arr[j] = arr[j+1];
                arr[j+1] = temp;
            }
        }
}

int main (void) {
    elemType arr[ARR_LEN] = {3,5,1,-7,4,9,-6,8,10,4};
    int len = 10;
    int i;

    bubbleSort (arr, len);
    for (i=0; i<len; i++)
        printf ("%d\t", arr[i]);
    putchar ('\n');

    return 0;
}
```